Twin Cities Army Ammunition Plant

Installation Action Plan

FY2005

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FY 2005

Twin Cities Army Ammunition Plant

Arden Hills, Minnesota

Statement of Purpose

The purpose of the Installation Action Plan (IAP) is to outline the total multi-year environmental restoration program for an installation. The plan will define Installation Restoration Program (IRP) requirements and propose a comprehensive approach and associated costs to conduct future investigations and remedial actions at each Operable Unit (OU) and Site at the installation and other areas of concern.

In an effort to coordinate planning information between the IRP manager, Installation Management Agencies (IMA/ISMA), installations, executing agencies, regulatory agencies, and the public, an IAP has been completed for the Twin Cities Army Ammunition Plant (TCAAP). The IAP is used to track requirements, schedules and tentative budgets for all major Army installation restoration programs.

All site-specific funding and schedule information has been prepared according to projected overall Army funding levels and is therefore subject to change during annual review of the document. Under current project funding, all remedies will be in place at TCAAP by the end of 2008.

The following agencies contributed to the formulation and completion of this 2005 Installation Action Plan for Twin Cities Army Ammunition Plant:

Alliant Techsystems Inc.

Atlanta Field Office (BRAC)

Engineering and Enviornment, Inc.

Minnesota Pollution Control Agency

Restoration Advisory Board Community Co-Chair

TCAAP

Tecumseh/Wenck Installation Support Services

US Army Corps of Engineers, Omaha District

US Army Environmental Center

US Army National Guard - Minnesota

US Environmental Protection Agency, Region V

Table of Contents

Table of Contents

Acronyms & Abbreviations

AEC	(United States) Army Environmental Center (formally called USATHMA)
AEDB-R	Army Environmental Database - Restoration
AST	Aboveground Storage Tank
ATK	Alliant Techsystems Inc.
BGRS	Boundary Groundwater Recovery System
CAMU	Corrective Action Management Unit
CERCLA	Comprehensive Environmental Response Compensation and Liability Act (1980)
CHPPM	(United States) Center for Health Promotion and Preventive Medicine (formally called USAEHA)
COC	Contaminant of Concern
CRA	Conestoga-Rovers & Associates
cy	cubic yards
DD	Decision Document
DSERTS	Defense Site Environmental Restoration Tracking System
DSMOA	Defense, State Memorandum of Agreement
EDTA	Ethylenediaminetetraacetic Acid
EE/CA	Engineering Evaluation/Cost Analysis
EPA	(United States) Environmental Protection Agency
ER,A	Environmental Restoration, Army (formally called DERA)
ERA	Ecological Risk Assessment
FFA	Federal Facility Agreement
FS	Feasibility Study
FY	Fiscal Year
GAC	Granular Activated Carbon
GRS	Groundwater Recovery System
GW	Groundwater
HHRA	Human Health Risk Assessment
HRC	Hydrogen Release Compound
HRI	Hazard Ranking Index
IAG	Inter-Agency Agreement
IAP	Installation Action Plan
IMA/ISMA	Installation Management Agency/Installation Special Management Agency
IRA	Interim Remedial Action
IRD	Interim Remedial Design
IRP	Installation Restoration Program
ISO	Installation Support Operation
ISV	In Situ Volatilization
K	$1,000
LitSAG	Litigation Settlement Agreement
LTM	Long Term Monitoring
LTO	Long Term Operation
LUC	Land Use Control
MDH	Minnesota Department of Health
MDNR	Minnesota Department of Natural Resources
MPCA	Minnesota Pollution Control Agency
MSC	Major Subordinate Command
NE	Not Evaluated
NBCGRS	New Brighton Contaminated Groundwater Recovery System
NFA	No Further Action
NOV	Notice of Violation

Acronyms & Abbreviations

NPL	National Priorities List
O&M	Operation & Maintenance
OU	Operable Unit
PA	Preliminary Assessment
PAH	Polynuclear Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PGAC	Permanent Granular Activated Carbon
PGRS	Plume Groundwater Recovery System
PRP	Potentially Responsible Party
QAPP	Quality Assurance Project Plan
RA	Remedial Action
RA(C)	Remedial Action - Construction
RA(O)	Remedial Action - Operation
RAB	Restoration Advisory Board
RC	Response Complete
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
REM	Removal Action
RI	Remedial Investigation
RIP	Remedy in Place
ROD	Record of Decision
RPM	Remedial Project Manager
RRG	Recommended Remediation Goals
RRSE	Relative Risk Site Evaluation
SI	Site Inspection
S&R	Supervision and Review
SVE	Soil Vapor Extraction
TAPP	Technical Assistance for Public Participation
TCAAP	Twin Cities Army Ammunition Plant
TCE	Trichloroethylene
TGRS	TCAAP Groundwater Recovery System
TRC	Technical Review Committee
TVA	Tennessee Valley Authority
TWISS	Tecumseh/Wenck Installation Support Services
USACHPPM	US Army Center for Health Promotion and Preventive Medicine
USAEHA	United States Army Environmental Hygiene Agency (now called CHPPM)
USATHMA	United States Army Toxic and Hazardous Material Agency (now called AEC)
UST	Underground Storage Tank
VOC	Volatile Organic Compound
WTP	Water Treatment Plant

Summary

STATUS:
25-square mile National Priorities List (NPL) site with 1983 Hazard Ranking Index (HRI) score of 59.6 and Federal Facility Agreement between Army, EPA, & MPCA.

TOTAL # OF AEDB-R SITES: 25 AEDB-R sites (2 RC sites were deleted)
ACTIVE ER,A SITES: 20 Active ER,A Eligible Sites
RESPONSE COMPLETE (RC) SITES: 8 Response Complete ER,A Eligible (includes 2 RC sites deleted)

DIFFERENT SITE TYPES: (Of the sites in AEDB-R)

7	Contaminated Groundwater	2	Surface Disposal Areas
1	Contaminated Sediments	1	Disposal Pit/Dry Well
2	Landfills	3	Chemical Disposal
2	Firing Ranges	1	Small Arms Range
2	Unexploded Munitions/Ordnance	4	Burn Areas

CONTAMINANTS OF CONCERN: Chlorinated Solvents, Explosives, Metals

MEDIA OF CONCERN: Groundwater, Surface Water, Soil, Sediment

COMPLETED REM/IRA/RA:

Tank Removal:
- 26 UST/14 AST (1993) RC & Deleted from AEDB-R $284K

RA:
- 1 Site Closed (Site J)/NFA (1994) RC & deleted from AEDB-R $376K
- 1 Site RIP (Water Tower)(1996) NFA/RC
- Site B RI/Closeout Report (2000)
- Trap Range Site RI/Closeout Report (2000)

IRA/RA:
- Site A IRA (1988) $ 48K
- 1 PCB Burn (1990) $500K
- 1 GAC/GRS (1990) $28,396K
- Site A RA (1994) $216K
- OU-3 RA (1994) - Funded by Alliant Techsystems Inc.

CURRENT IRP PHASES: **RI/FS** 1 Site **RA(C)** 9 Sites **RA(O)** 1 Site

PROJECTED IRP PHASES: **RI/FS** 1 Site **RA(C)** 2 Sites **RA(O)** 1 Site **RD** 2 Sites **LTM** 19 Sites

IDENTIFIED POSSIBLE REM/IRA/RA:
- Site cover at TCAAP-09
- Pump and treat at TCAAP-19
- Sewer system removal at TCAAP-23
- Soil treatment at TCAAP-05,-06
- Removal Action at TCAAP-05

DURATION:
YEAR OF IRP INCEPTION: 1981
YEAR OF ALL REMEDIES IN PLACE: 2008
YEAR OF IRP COMPLETION INCLUDING LTM: 2040
DELISTING FROM THE NPL: 2041

Installation Information

SITE DESCRIPTION:

Historically, the Twin Cities Army Ammunition Plant (TCAAP) occupied approximately four square miles, or 2,370 acres, in northwest Ramsey County, Minnesota and is within the Minneapolis/St. Paul metropolitan area. TCAAP was declared excess to DOD in 2002. 1,521 acres have been reassigned to the National Guard Bureau and 6.9 acres were transferred to the City of Arden Hills, MN. TCAAP is still responsible for all remediation on the reassigned and transferred property.

IRP EXECUTING AGENCIES:

Remedial Investigation/Feasibility Study: Installation and the US Army Environmental Center

Remedial Design/Remedial Action: Installation and US Army Corps of Engineers, Omaha District

REGULATORY PARTICIPATION:

Federal: US Environmental Protection Agency (EPA), Region V
US Fish and Wildlife Service

State: Minnesota Pollution Control Agency (MPCA)
Minnesota Department of Health (MDH)
Minnesota Department of Natural Resources (MDNR)

REGULATORY STATUS:

- National Priorities List (NPL), confirmed on- and off-post contamination
- Technical Review Committee (TRC) meetings on monthly basis
- Interagency Agreement, Federal Facility Agreement (FFA), December 1987
- 15 sites are listed on the RCRA Permit (Sites B, F and J are closed, and 15 are currently addressed under CERCLA)

MAJOR CHANGES TO IAP FROM PREVIOUS YEAR:

None

Installation Description

DESCRIPTION:

The TCAAP facility is managed through an installation support services contract. The TCAAP facility has over 300 structures, including six major production buildings, numerous auxiliary buildings and supporting utilities, and a daytime population of approximately 370 people. The installation support services contractor is Tecumseh/Wenck Installation Support Services (TWISS). The remaining 774 acres of TCAAP were declared excess to the needs of the DOD in 2002 and continues to have one major manufacturing tenant - Alliant Techsystems Inc. (ATK). ATK [formerly part of Honeywell, Inc. which is a potentially responsible party (PRP) for the Site] has been manufacturing fuzes and selected ammunition at the facility since the late 1950s. ATK is cooperating with the Army in the cleanup of past contamination.

TCAAP was approximately 2,370 acres in size. 1,521 acres have been reassigned to the National Guard Bureau and 6.9 acres were transferred to the City of Arden Hills, MN. TCAAP is still responsible for all remediation on the reassigned and transferred property.

HISTORY:

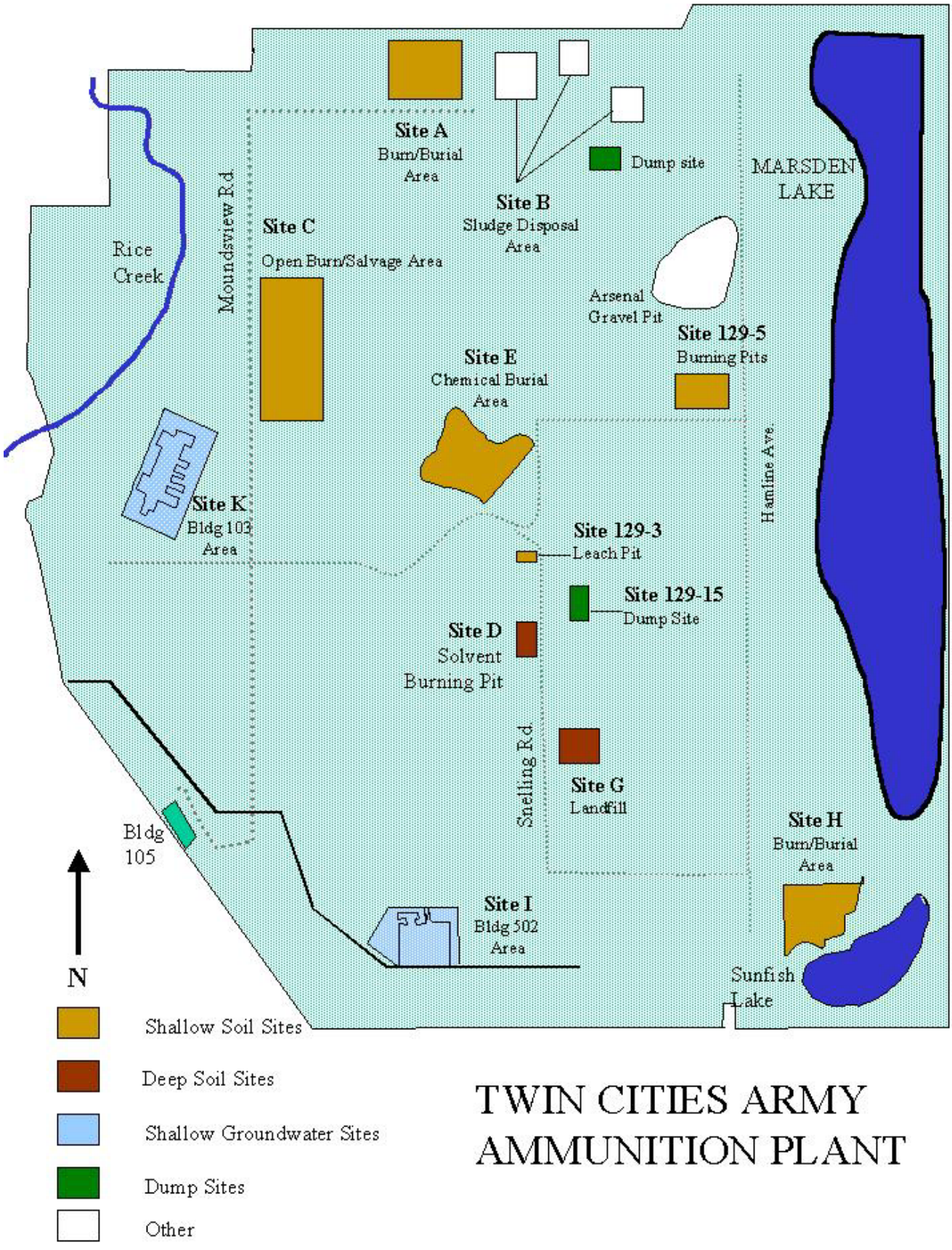
The construction of TCAAP began on August 28, 1941, on a site that was primarily farmland. Field construction was completed in January 1943. The primary function of the facility was the manufacture of small caliber ammunition and related materials and 105mm and 155mm projectile metal parts, the proof testing of small caliber ammunition, and the storage and handling of strategic and critical raw materials for other government agencies. The majority of ammunition manufacturing occurred during WWII, the Korean Conflict, and the Southeast Asia Conflict. There were numerous tenants, most of which performed non-military activities, but were industrial based. The TCAAP Preliminary Assessment (PA) details activities of the various tenants.

REGULATORY STATUS:

The 25-square mile New Brighton/Arden Hills Superfund Site (which includes the entire 4-square mile TCAAP facility) was proposed for addition to the National Priorities List (NPL) in 1982. The Superfund Site made the Final NPL in September 1983 with a score of 59.6.
A three-party Federal Facility Agreement (FFA) between the Army, EPA, and MPCA was implemented in December 1987. A two-party DSMOA/ Cooperative Agreement between the Army and MPCA became effective in June 1991. The regulatory driver for TCAAP is the Inter-Agency Agreement/Federal Facilities Agreement (IAG/FFA) associated with the NPL site. A Record of Decision (ROD) was completed for OU-3 in September 1992, OU-1 in September 1993, and OU-2 in December 1997.

Site 29 (Army Environmental Center (AEC) Phytoremediation Demonstration Project Corrective Action/Notice of Violation) is currently being addressed as an enforcement action.

Installation Description



Contamination Assessment

OVERVIEW

The IRP began in June 1981 when the Army and MPCA discovered chlorinated solvents or volatile organic compounds (VOCs) in TCAAP and New Brighton drinking water supplies, indicating that TCAAP may be the source of contamination. Residents were supplied with alternate water supplies as studies of TCAAP activities and groundwater were initiated.

TCAAP currently has a total of 25 Defense Site Environmental Restoration Tracking System (AEDB-R) sites, 19 are active and 8 are Response Complete. These sites consist of contaminated groundwater, surface disposal areas, contaminated sediment, disposal pit/dry well, landfills, chemical disposal, firing ranges, small arms ranges, unexploded munitions/ordnance, and burn areas. After site characterization, the potential of encountering unexploded munitions/ordnance is low.

As a result of past TCAAP ammunition manufacturing operations, contamination has been detected in groundwater, soil, sediment, and surface water. The primary contaminants of concern in all medias is metals, with the addition of chlorinated solvents (TCE) being found in the groundwater and soil.

The TCAAP IRP activities include three operable units - OU-1, OU-2, and OU-3. OU-3, which is the south TCAAP plume (TCAAP-27) located outside the fenced boundaries of TCAAP, was the first operable unit for which Remedial Action (RA) was initiated (pump and treat/containment system). The OU-3 Record of Decision (ROD) was signed in 1992. The RA consisted of construction of the Plume Groundwater Recovery System (PGRS) which started operation in 1994. Alliant Techsystems is completely responsible for funding this activity. The Army has been given regulatory approval to temporarily discontinue pumping this system because they have been pumping clean containment water for several years. Monitoring will continue.

OU-1 was the second operable unit for which RA was initiated. Prior to the RA being initiated, an Interim Remedial Action (IRA) (pump and treat/containment system) was constructed and began operation. The OU-1 ROD was signed in 1993. The RA focuses on remediating deep groundwater contamination in the north TCAAP Plume (TCAAP-17), located off-site. This remediation includes the New Brighton Contaminated Groundwater Recovery System (NBCGRS), a municipal water-line interconnection, alternative well water supplies, additional production and monitoring wells and well advisories. Contaminant levels in the groundwater continue to decline. Technical studies are underway to re-evaluate the containment requirement of the OU-1 ROD.

The third operable unit, OU-2, includes the 13 contaminated soil sites (TCAAP-01, 02, 05, 06, 07, 08, 09, 10, 11, 12, 13, 15, 16) and deep groundwater (TCAAP-19) within the boundaries of TCAAP. An IRA was initiated in 1987 to pump and treat/contain the deep groundwater contamination. The OU-2 ROD was signed in December 1997 and included all the above-listed sites except TCAAP-08 (Site F) which has a regulator-approved Resource Conservation and Recovery Act (RCRA) Closure Plan. Studies are underway to optimize the operation and maintenance (O&M) of this system.

Sites on the New Brighton/Arden Hills NPL site being addressed as removal actions (REMs) include TCAAP-20, 21, 22, 23, 24, 25, 28, and 29 as a corrective action.

OVERVIEW (cont)

In response to off-TCAAP groundwater contamination, the Army constructed the Boundary Groundwater Recovery System (BGRS) in 1987 to contain and treat the source area and contaminated groundwater plume emanating from the installation. The BGRS was later modified to become the TCAAP Groundwater Recovery System (TGRS). The Army also funded the construction of a permanent granular activated carbon (PGAC) treatment facility for the city of New Brighton to treat the contaminated groundwater within the "North Plume" of Operable Unit 1. The Interim PGAC became operational in 1990. During the same year, a groundwater treatment facility, funded by the EPA, was constructed for the city of St. Anthony. In 1994, the final PGRS became operational to contain and treat the contaminated groundwater within the "South Plume."

Regulatory interest (state and federal) is very high since TCAAP is a NPL site and is Minnesota's No. 1 environmental cleanup project. The Army continues an effective public involvement program with the community.

For FY02, operation and maintenance of all RAs at OU-1 and OU-3 are in progress. The extraction well #13 for OU-3 has been temporarily shutoff and put in 5-year standby mode of operation with increased monitoring while the aquifer continues to show trends toward cleanup. Shallow soil Sites E and 129-3 have received partial closeout from the regulators. Documentation and closeout of the permanent soil cover over the dump area at Site129-15. Final closeout for the sites above (regulatory consistency determination in accordance with TCAAP Federal Facility Agreement) are being held up due to regulatory requirements for Land Use Controls to be documented in the closeout report. Army abandoned 25 monitoring wells which are no longer needed for the IRP program. At Site A the SVE/AS system has been terminated and 688 cy of VOC-contaminated soil has been removed. The field work at Site C was suspended indefinitely due to regulatory issues. Received approval for the work plan for Site D and removed 1,381 cy of contaminated soil. Received regulatory approval for the revised remediation goal at Site G which meant the SVE system was no longer needed. The Corrective Action Management Unit (CAMU) was removed with regulatory concurrence. The installation of Well B-13 replaced Well B-2 at the TGRS. The Site K interim remedy became the final remedy. The Site Inspection field work was completed for the 135 Primer/Tracer Area and the Tier II Risk Assessment is under regulatory review.

PREVIOUS STUDIES

Date	Author	Title
1-Feb-03	CRA	Site K Remedial Action Report
3-Dec-02	Stone & Webster	Final Site 129-15 Dump Investigation, Characterization, and Remedial Action Completion and Close Out Report, Revision 3
1-Dec-02	Wenck Associates, Inc.	Fiscal Year 2001 Annual Performance Report
21-Nov-02	Stone & Webster	Final Technical Memorandum, Site C Characterization Work Plan, Revision 1
21-Nov-02	Stone & Webster	Final Remedial Action Completion and Shallow Soil Sites Close Out Report, Volume V, Site 129-3 Activities, Revision 2
25-Sep-02	Stone & Webster	Final Comprehensive Work Plan, Final Sampling and Analysis Plan, Final Site Safety and Health Plan, Remedial Design/Remedial Action Activities, Shallow Soil Sites, Revision 2
3-Sep-02	Tecumseh/Wenck	FY 2003 Installation Action Plan for Twin Cities Army Ammunition Plant
16-Aug-02	Stone & Webster	Final Site D Shallow and Deep Soil Volatile Organic Compound Investigation and Close Out Report, Revision 2
12-Jul-02	Stone & Webster	Final Technical Memorandum List of the Proposed Wells for Phase II Sitewide Monitoring Well Abandonment, Revision 1
13-Jun-02	Stone & Webster	Final Remedial Action Completion and Shallow Soil Sites Close Out Report, Volume IV, Site E Activities, Revision 2
29-May-02	EnecoTech Midwest, Inc.	Summary Report for Grenade Range Groundwater Investigation at Marsden Lake, Revision 2
1-Mar-02	Alliant Techsystems Inc.	Site Inspection, 135 Primer/Tracer Area, Work Plan, Field Sampling Plan, Site Specific Health and Safety Plan
7-Feb-02	Stone & Webster	Final Remedial Action Completion and Shallow Soil Sites Close Out Report, Volume III, Site H Activities, Revision 2
27-Dec-01	Wenck Associates, Inc.	Technical Memorandum, TCAAP OU-1 Recommended ROD Modification
10-Dec-01	Stone & Webster	Final Remedial Action Completion and Shallow Soil Sites Close Out Report, Appendices G– X, Revision 2
10-Dec-01	Stone & Webster	Final Remedial Action Completion and Shallow Soil Sites Close Out Report, Appendices A – F, Revision 2
10-Dec-01	Stone & Webster	Final Remedial Action Completion and Shallow Soil Sites Close Out Report plus Drawings, Volume I - Site A Activities, Volume II - Site 129-5 Activities, Revision 2
1-Dec-01	CRA	Site K Predesign Investigation Report
1-Dec-01	Alliant Techsystems Inc.	Final Preliminary Assessment, 535 Primer/Tracer Area
1-Dec-01	Alliant Techsystems Inc.	Final Preliminary Assessment, 135 Primer/Tracer Area
1-Dec-01	Alliant Techsystems Inc.	Final Closeout Report, Outdoor Firing Range and #150 Reservoir Site, Soil Removal Action Completion of Soil Removal, Revision 1
8-Nov-01	Stone & Webster	Addendum 1 to the Comprehensive Work Plan, Remedial Design/Remedial Action Activities, Shallow Soil Sites for the CAMU Construction and Closure, Revision 2
1-Nov-01	Wenck Associates, Inc.	Fiscal Year 2000 Annual Performance Report
18-Oct-01	Stone & Webster	Addendum 3 to the Sites D and G Work Plan, Sampling and Analysis Plan, and Site Safety and Health Plan, Site D Shallow Soils Investigation, Revision 3

PREVIOUS STUDIES (cont)

Date	Author	Title
1-Oct-01	US Army	Site A Shallow Groundwater Containment System
1-Oct-01	Tecumseh/Wenck	Site D Soil Vapor Extraction (SVE) Dismantlement Report
25-Sep-01	Tecumseh/Wenck	FY 2002 Installation Action Plan for Twin Cities Army Ammunition Plant
13-Sep-01	Stone & Webster	Final Startup Report, Site A Soil Vapor Extraction/Air Sparging System, Revision 2
11-Sep-01	Stone & Webster	Final Sitewide Groundwater Monitoring Well Abandonment Work Plan, Revision 1
7-Sep-01	Stone & Webster	Final Comprehensive Work Plan, Site 129-15 Dump Cover, Revision 2
5-Jul-01	Stone & Webster	Technical Memorandum, Site G RRG Calculations
1-Jul-01	Alliant Techsystems Inc.	Final Closeout Report, Grenade Range Soil Removal Action Completion of Soil Removal
20-Jun-01	Stone & Webster	Technical Memorandum, Site E1-2 West Dump Cover Design, Revision 1
13-Mar-01	Tecumseh/Wenck	FY 2001 Installation Action Plan for Twin Cities Army Ammunition Plant
6-Mar-01	SECOR International	Progress Report: Site K Pilot Tests of Hydrogen Release Compound and Direct Hydrogen Delivery Using Gas Permeable Membranes
1-Mar-01	CRA	Dual Phase Vacuum Extraction Pilot Study, Predesign Investigation Report, Site I
11-Jan-01	Wenck Associates, Inc.	TCAAP OU1 Containment Analysis Redlines
8-Jan-01	Stone & Webster	Final Site B Dump Investigation, Characterization, and Close Out Report, Revision 2
1-Dec-00	Tecumseh/Wenck	Sampling Work Plan Addendum
10-Oct-00	Stone & Webster	Final Addendum 2 Comprehensive Work Plan, RD/RA Activities, Site H Dump Cover, Revision 1
1-Oct-00	Argonne National Lab	Soil Vapor Extraction System: A Post-Audit Modeling Study
1-Oct-00	CRA	Plume History Evaluation, Operable Unit 3, Twin Cities Army Ammunition Plant, Technical Memorandum in Support of Alliant Techsystems Inc.'s Request to Shut Down the Plume Groundwater Recovery System (PGRS) in Operable Unit 3 of the New Brighton/Arden Hills Superfund Site
1-Oct-00	Wenck Associates, Inc.	Fiscal Year 1999 Annual Performance Report
1-Sep-00	EPA	Evaluation of the Protocol for Natural Attenuation of Chlorinated Solvents: Case Study at the Twin Cities Army Ammunition Plant
1-Aug-00	Montgomery Watson	OU-1 Remedial Action Report
18-Jul-00		Inventory of Military Real Property
1-Jun-00	EPA	Evaluation of Natural Attenuation of Chlorinated Solvents in Groundwater at the Twin Cities Army Ammunition Plant – Site A
1-May-00	Montgomery Watson	Twin Cities Army Ammunition Plant - OU-1 Pumping Test Report
13-Mar-00	Stone & Webster	Final Conceptual Design Report, Site A Soil Vapor Extraction/Air Sparging System, Revision 3
3-Mar-00	Wenck Associates, Inc.	TCAAP OU-1 Containment Analysis, Responses to Comments
1-Mar-00	Alliant Techsystems Inc.	TCAAP Installation Action Plan for Twin Cities Army Ammunition Plan
1-Feb-00	Alliant Techsystems Inc.	Removal Site Evaluation, Preliminary Assessment, Trap Range Site
1-Jan-00	TVA	A Letter Report on the Results of the 1999 Field Demonstration of Phytoremediation of Lead-Contaminated Soil at the Twin Cities Army Ammunition Plant

PREVIOUS STUDIES (cont)

Date	Author	Title
1-Jan-00	Alliant Techsystems Inc.	Results of Sampling and Analysis of Soil Vapor Extraction (SVE) Vents at Sites D and G
1-Dec-99	Wenck Associates, Inc.	TCAAP OU1 Containment Analysis
1-Nov-99	Alliant Techsystems Inc.	Non-Time Critical Removal Action, Grenade Range, Work Plan, Field Sampling Plan, Site-Specific Health and Safety Plan
1-Sep-99	Alliant Techsystems Inc.	Non-Time Critical Removal Action, Outdoor Firing Range, Work Plan, Field Sampling Plan, Site-Specific Health and Safety Plan
1-Sep-99	Wenck Associates, Inc.	Five-Year Review Report of the Final Remedy for the New Brighton/Arden Hills Superfund Site
27-Aug-99	Stone & Webster	Final Field Investigation Report, Site G Tar-Like Material, Revision 2
1-Jul-99	Wenck Associates, Inc.	Fiscal Year 1998 Annual Performance Report
1-Jul-99	Alliant Techsystems Inc.	Site F Closure Certification Report, Volume 3 - Appendices K – Z
1-Jul-99	Alliant Techsystems Inc.	Site F Closure Certification Report, Volume 2 - Appendices A–J
1-Jul-99	Alliant Techsystems Inc.	Site F Closure Certification Report, Volume 1 - Text, Tables, and Figures plus Drawings
1-Jun-99	US Army CHPPM	Work Plan, Tier II Ecological Risk Assessment
1-May-99	Alliant Techsystems Inc.	FY 1999 Installation Action Plan for Twin Cities Army Ammunition Plant
1-Apr-99	CRA	Sampling Work Plan,Performance Monitoring, Remedial Design/Remedial Action
1-Mar-99	Montgomery Watson	Alternate Water Supply Construction Report for Period 1997 through 1998
1-Mar-99	CRA	Inventory of Wells in the Vicinity of TCAAP, 1996/1997 Update
1-Mar-99	TVA	Results of the 1998 Field Demonstration and Preliminary Implementation Guidance for Phytoremediation of Lead-Contaminated Soil at the Twin Cities Army Ammunition Plant (Report No. SFIM-AEC-ET-CR-99001)
1-Mar-99	Stone & Webster	Final Interim Shallow Soil Closeout Report, 1998 Remedial Design/Remedial Action Activities plus Drawings, Revision 1
1-Feb-99	CRA	Site K Predesign Investigation Work Plan
1-Jan-99	CRA	Site I Predesign Investigation Work Plan
24-Sep-98	Stone & Webster	Final Comprehensive Work Plan, Remedial Design/Remedial Action Activities, Operable Unit 2, Units 3 and 4 Deep Groundwater
21-Sep-98	Stone & Webster	Final Addendum 1 to the Work Plan, Sampling and Analysis Plan, and Site Safety and Health Plan for Sites D and G Pilot Study, Site G Tar-Like Material Investigation, Revision 2
21-Sep-98	Stone & Webster	Final Work Plan, Final Sampling and Analysis Plan, Sites B and 129-15 Dump Characterization, Revision 2
1-Sep-98	EPA	Cognis Terramet Lead Extraction Process, Innovative Technology Evaluation Report, SITE Superfund Innovative Technology Evaluation
3-Aug-98	Stone & Webster	Final Site A Engineering Evaluation/Cost Analysis, Revision 0
1-Aug-98	US Army CHPPM	Work Plan Correspondence, Addendum 1, Tier II Ecological Risk Assessment Work Plan
1-Aug-98	Montgomery Watson	Operable Unit 1 Off Post Monitoring Well Construction Report
1-Aug-98	Wenck Associates, Inc.	Fiscal Year 1997 Annual Performance Report and Drawings
1-Jul-98	Barr Engineering	Construction Documentation Report, OU1 Modifications, Well 15 and Well 15 Wellhouse
26-Jun-98	Stone & Webster	Final Addendum 3 Quality Assurance Project Plan, Remedial Design/Remedial Action, Revision 1

PREVIOUS STUDIES (cont)

Date	Author	Title
1-Jun-98	Montgomery Watson	Remedial Design/Remedial Action Quality Assurance Project Plan, Addendum 2
1-Jun-98	US Army CHPPM	Sediment Toxicity Evaluation of Round Lake, Preliminary Study, Tier II Ecological Risk Assessment (10-15 July 1995)
1-May-98	US Army CHPPM	Health and Safety Plan, Part 3, Tier II Ecological Risk Assessment Work Plan
1-May-98	Montgomery Watson	Operable Unit 1 Aquifer Test Work Plan
9-Mar-98	Stone & Webster	Final Design Report, Site D Soil Vapor Extraction Pilot Study
9-Mar-98	Stone & Webster	Final Field Sampling Report, Sites D and G
6-Mar-98	US Army CHPPM	Bioavailability of Sediment-Metals in Round and Sunfish Lakes, Preliminary Study Tier II Ecological Risk Assessment
1-Mar-98	TVA	Technology Demonstration Plan for Phytoremediation of Lead-Contaminated Soil at the Twin Cities Army Ammunition Plant (Report No. SFIM-AEC-ET-CR-98008)
1-Mar-98	TVA	Environmental Assessment for the Demonstration of Phytoremediation of Lead-Contaminated Soils
1-Mar-98	Alliant Techsystems Inc.	Grenade Range Engineering Evaluation/Cost Analysis (EE/CA), December 1997, Revised March 1998
1-Mar-98	Alliant Techsystems Inc.	Outdoor Firing Range Engineering Evaluation/Cost Analysis (EE/CA)
9-Feb-98	Alliant Techsystems Inc.	Installation Services Support Contract Activities, Emergency Plan for Building 105, 4700 Highway 10, Arden Hills, MN 55112-3928
1-Feb-98	Alliant Techsystems Inc.	FY 1998 Installation Action Plan for Twin Cities Army Ammunition Plant
27-Oct-97	US Army CHPPM	Tier I Screening Risk Assessment of Aquatic Ecosystems No. 39-EJ-1393-97 (October 1992 – July 1993)
1-Oct-97	USAEC	Operable Unit 2 Record of Decision
1-Sep-97	GTS Duratek, Inc.	Characterization Study Report, The Twin Cities Army Ammunition Plant, Depleted Uranium Facilities, Revision 0
1-Sep-97	Wenck Associates, Inc.	Fiscal Year 1996 Annual Monitoring Report
1-Aug-97	Barr Engineering	Construction Documentation Report, OU1 Modifications: Well 14 and Well 14 Wellhouse
1-Jul-97	Barr Engineering	Bidding Documents and Drawings, City of New Brighton, Improvement Number 93-09, OU1 Modifications, Well 15 Wellhouse
1-Jun-97	Wenck Associates, Inc.	"Road Map" for Army Agency Approval of Ordnance and Explosives Clearance Work Completed at TCAAP
1-Jun-97	Wenck Associates, Inc.	Comprehensive Unexploded Ordnance Compilation Report, Volume I and Volume II
1-May-97	Montgomery Watson	Operable Unit 1, Off-Post Monitoring Well Work Plan
22-Apr-97		Twin Cities Army Ammunition Plant OU-2 Public Meeting Minutes
1-Apr-97	Stone & Webster	Addendum 1, Remedial Design/Remedial Action Quality Assurance Project Plan
1-Apr-97	Stone & Webster	Final Work Plan, Final Sampling and Analysis Plan, Final Site Safety and Health Plan, Site A Investigation
1-Mar-97	CRA	Inventory of Wells in the Vicinity of TCAAP, 1995 Update
1-Mar-97	Montgomery Watson	Operable Unit 2 Feasibility Study
1-Feb-97	Barr Engineering	Final Design Report, Containment/Production Wells, Well 15 Construction, Well 7 Abandonment
1-Feb-97	Alliant/GES	Community Relations Plan

PREVIOUS STUDIES (cont)

Date	Author	Title
1-Jan-97	Stone & Webster	Final Work Plan, Final Sampling and Analysis Plan, Final Site Safety and Health Plan, Sites D and G Pilot Study
1-Oct-96	Barr Engineering	Final Design Report, OU1 Modifications Control System Integration and Drawings
1-Oct-96	Wenck Associates, Inc.	Fiscal Year 1995 Annual Monitoring Report and Drawings
1-Sep-96	Alliant/GES	Health and Safety Plan, Environmental Field Activities
1-Sep-96	Montgomery Watson	Remedial Design/Remedial Action Quality Assurance Project Plan
1-Sep-96	Montgomery Watson	Remedial Design/Remedial Action Quality Assurance Project Plan, Laboratory Attachment A Specific to: Roy F. Weston, Inc.
1-Sep-96	Montgomery Watson	Remedial Design/Remedial Action Quality Assurance Project Plan, Laboratory Attachment B Specific to: Data Chem Laboratories
1-Sep-96	Montgomery Watson	Remedial Design/Remedial Action Quality Assurance Project Plan, Laboratory Attachment C Specific to: CompuChem Environmental Corporation
18-Jun-96	USAEC	Assessment of Applicable or Relevant and Appropriate Requirements (ARARs) and To-Be-Considered (TBC) Guidance for Operable Unit 2 (OU-2) at Twin Cities Army Ammunition Plant, Minnesota
1-Mar-96	Montgomery Watson	Operable Unit 1, Off-Post Monitoring Well Conceptual Design Report
26-Feb-96	Alliant Techsystems Inc.	TCAAP Operations, Part B RCRA Hazardous Waste Facility Permit Application
1-Feb-96	Barr Engineering	Bidding Documents, City of New Brighton, Improvement Number 93-09, OU1 Modifications, Well 14 Wellhouse
1-Jan-96	Barr Engineering	Construction Documentation Report, PGAC Raw and Waste Water Pipelines, City of New Brighton, Minnesota
1-Oct-95	STS Consultants	90 Day Operations Report
1-Oct-95	Montgomery Watson	Operable Unit 1 Performance Monitoring Plan
1-Oct-95	Montgomery Watson	TCAAP IRP Monitoring Well Ownership, Access, and Abandonment Plan
1-Sep-95	Wenck Associates, Inc.	Fiscal Year 1994 Annual Monitoring Report and Drawings
1-Sep-95	Loucks & Associates	Phase I Archeological Investigations of the Trap Shooting Area and CERCLA Site B
1-Aug-95	Argonne National Lab	Environmental Geophysics and Sequential Aerial Photo Study at Sunfish and Marsden Lakes
1-Apr-95	AFCEE	A Performance and Cost Evaluation of Purus Padre®, Regenerative Resin System for the Treatment of Hydrocarbon Vapors From Fuel-Contaminated Soils
1-Dec-94	AFCEE	A Performance and Cost Evaluation of Internal Combustion Engines for the Destruction of Hydrocarbon Vapors From Fuel-Contaminated Soils
1-Dec-94	AFCEE	A Performance and Cost Evaluation of EG&G's Biocube™, Aerobic Biofiltration System for the Destruction of Hydrocarbon Vapors from Fuel-Contaminated Soils
30-Aug-94	EPA	Symposium on Intrinsic Bioremediation of Ground Water, Hyatt Regency Denver, Denver, Colorado (August 30 – September 1, 1994)
1-Jun-94	AFCEE	Use of Risk-Based Standards for Cleanup of Petroleum Contaminated Soil
1-Jun-94	Wenck Associates, Inc.	Fiscal Year 1993 Annual Monitoring Report and Drawings
1-May-94	CRA	TCAAP Operable Unit 2 Feasibility Study, Sites I & K Field Investigation Data Report
1-Mar-94	Montgomery Watson	Final Site J Closure Report

PREVIOUS STUDIES (cont)

Date	Author	Title
1-Feb-94	AFCEE	Addendum One to Test Plan and Technical Protocol for a Field Treatability Test for Bioventing - Using Soil Gas Surveys to Determine Bioventing Feasibility and Natural Attenuation Potential
15-Nov-93	EPA	State Summary of Soil and Groundwater Cleanup Standards for Hydrocarbons
1-Sep-93		Record of Decision, Groundwater Remediation Operable Unit 1
7-Jul-93	Wenck Associates, Inc.	Addendum to the Site F Closure Plan
1-Jul-93	Montgomery Watson	Feasibility Study, Final OU-1 FS
1-Jul-93	Wenck Associates, Inc.	Fiscal Year 1992 Annual Monitoring Report
23-Nov-92		CERCLA Administrative Record New Brighton/Arden Hills NPL Site, Master Record of Decision Index
1-Oct-92	Wenck Associates, Inc.	Fiscal Year 1991 Annual Monitoring Report and Drawings
30-Sep-92	IT Corporation	Aquifer Test - Site A
1-Jul-92	CRA	Operable Unit 3 Feasibility Study
1-May-92	AFCEE	Test Plan and Technical Protocol for a Field Treatability Test for Bioventing
1-Jul-91	CRA	Groundwater Recovery System (TGRS), IRA-TGRS, Site I and Site K 1990 Annual Monitoring Report, Volume 1 – Text, Volume 2 – Appendices
1-Jun-91	CRA	Groundwater Recovery System (TGRS), IRA-TGRS 1989 Annual Monitoring Report and Monitoring Plan, Volume 1 – Text, Volume 2 – Appendices
1-Apr-91	PRC	Human Health Risk Assessment New Brighton/Arden Hills Superfund Site - Volume I & II
1-Apr-91	Argonne National Lab	Remedial Investigation Report - Volumes 1, 2, 3, & 4
1-Feb-91	Camp Dresser & McKee	Phase IA Multi-Point Source Groundwater Remedial Investigation - Volume I & II, + Drawings
1-May-90	Wenck Associates, Inc.	1989 Annual Monitoring Report, Volume 1 of 3 – Text, Volume 2 of 3 – Tables, Volume 3 of 3 – Figures
1-Apr-90	Wenck Associates, Inc.	Fiscal Year 1990 Annual Monitoring Plan, Volume 1 of 3 – Text, Volume 2 of 3 – Appendix C – Figures 1 - 635, Volume 3 of 3 – Appendix C – Figures 636 - 1271
1-Feb-90	USAEHA	Ecological Assessment (February 1990 - April 1991) - Volume I & Appendices
1-Oct-89	CRA	Boundary Groundwater Recovery System (BGRS), IRA-BGRS 1988 Annual Monitoring Report and Monitoring Plan, Volume 1 – Text, Volume 2 – Appendices
1-Sep-89	Wenck Associates, Inc.	1988 Annual Monitoring Report, Volume I, II, III, IV
1-Feb-88	Argonne National Lab	Supplement to the Preliminary Assessment of the Twin Cities Army Ammunition Plant
1-Feb-88	Argonne National Lab	Preliminary Assessment of the Twin Cities Army Ammunition Plant and Drawings and Maps
1-Oct-78	USATHMA	Installation Assessment of Twin Cities Army Ammunition Plant, Report No. 129

OU-2, EARLY BURN/BURIAL AREA (SITE A)
TCAAP-01

SITE DESCRIPTION

Site A, approximately 12.3 acres, was used between the early 1940s and 1966 for burial and/or burning of various wastes, such as sewage sludge, solvents, explosive-containing wastes, and mercury crack cases. These activities resulted in the contamination of the shallow soil and shallow groundwater with volatile organic compounds (VOCs) and metals.

An Engineering Evaluation/Cost Analysis (EE/CA) was conducted which resulted in a Removal Action (REM) to prevent off-site migration of VOCs in the shallow aquifer. Eight extraction wells were installed in 1994, with discharge to the sanitary sewer. The OU-2 ROD (1997) designated the system as the final RA. Four of the wells were shut down in 2000, as the plume had reduced in size.

STATUS

RRSE RATING: High (1A)

CONTAMINANTS: VOCs, Metals

MEDIA OF CONCERN: Soil, Groundwater

COMPLETED IRP PHASE: PA/SI, RI/FS, IRA, RD

CURRENT IRP PHASE: RA(C), RA(O)

FUTURE IRP PHASE: LTM

The OU-2 ROD also specified stabilization, excavation, and off-site disposal of the shallow, metals-contaminated soil to site-specific industrial standards. Approximately 16,300 cy of contaminated soil were removed and disposed of in 1998-1999 which completed the field work. A closeout report for shallow contaminated soils received partial approval in 2001 from the regulators. Final approval is subject to resolution of land use control (LUC) issues.

Additional site characterization was performed in 1997 that identified a disposal trench as the source of VOC contamination in the shallow soils. Following approval of an EE/CA, a REM was conducted for these soils. A SVE/air sparging system was operated between 2000-2002. Soil sampling in 2002 suggested that the SVE system would not achieve the cleanup levels. The regulators then approved a work plan for excavation and off-site disposal of the VOC-contaminated soil, and the SVE system was dismantled. Approximately 688 cy were removed in November 2002, which completed the field work. The closeout report for this work received regulatory approval in 2003.

PROPOSED PLAN

Continue RA(O) of the shallow groundwater containment system, which will be funded under TCAAP-19.

Five-year groundwater monitoring related to metals (2003-2007), which will be funded under TCAAP-19.

Resolve LUC issues (expected in 2004) in order to obtain final regulatory approval for soil RA(C) closeout report (in 2005). LUC implementation (National Guard) and 5-year reviews (funded under TCAAP-19) will continue indefinitely, and are considered RA(O) until Response Complete, and then will be considered LTM.

OU-2 OPEN BURN AREA/SALVAGE AREA (SITE C)
TCAAP-05

SITE DESCRIPTION

Site C, approximately 6.4 acres, was used for burning scrap wooden boxes, solvents, oils, and production materials from 1947 through 1957. It was also used for land disposal and open storage.

The OU-2 ROD (1997) requires excavation, stabilization, and off-site disposal of the contaminated soil to site-specific industrial standards. Excavation work during 2000-2002 removed approximately 16,000 cy of contaminated soil. Work stopped in July 2002 due to an issue raised by the regulators involving unanticipated site conditions. The issue involves whether excavation to groundwater is adequate (at this site, typically 2-5 feet below ground), or whether a revised remedy is needed. Additional characterization work was completed in November 2002 to assess the amount of contamination which may be left in place below the water table. During review of the results and an alternatives analysis, the regulators requested additional sampling of sediments in ditches at the site, which was performed in 2003. Also, the regulators gave approval for excavation work to continue at the south end of the site, where contamination was less than 2 feet deep. Approximately 2,500 cy were removed in 2003. The alternatives analysis recommends a combination of excavation and/or placement of fill to provide a 4-foot soil cover serving as a protective barrier between the ground surface and any contamination remaining in place. Further field work is on hold pending resolution of this issue with the regulators and RAB. It is assumed that a ROD Amendment will be signed in 2004, that field work will be completed in 2005, and the closeout report will get approved in 2006.

(For phytoremediation demonstration that occurred at Site C, see Site TCAAP-29.)

STATUS

RRSE RATING: High (1A)

CONTAMINANTS: Metals

MEDIA OF CONCERN: Soil

COMPLETED IRP PHASE:
PA/SI, RI/FS, RD

CURRENT IRP PHASE:
RA(C), RA(O)

FUTURE IRP PHASE:
LTM

PROPOSED PLAN

Resolve remedy issues, execute a ROD amendment, amend the workplan, and complete the RA(C), including the closeout report.

Five-year groundwater monitoring (2003-2007), which will be funded under TCAAP-19.

Resolve LUC issues (expected in 2004) in order to obtain final regulatory approval for the soil RA(C) closeout report. LUC implementation, cover maintenance, and 5-year reviews (all funded under TCAAP-19) will continue indefinitely, and are considered RA(O) until Response Complete, and then will be considered LTM.

OU-2 LEACH PITS/SOLVENT BURN (SITE D)
TCAAP-06

SITE DESCRIPTION

The pits on Site D, approximately 1.8 acres, were used for burning of sump wastes, scrap propellants, solvents, paint thinners, oils, rags and chemicals, in addition to the dumping of neutralized cyanide wastes from approximately 1949/1950 to 1968.

Interim remedial actions (IRA) included excavation of approximately 1,470 cy of PCB-contaminated soil, with subsequent on-site incineration in 1989. Residual PCB contamination is overlain by a soil cover.

An 18-inch thick clay cover was installed at the site in 1985. An SVE system was implemented as an IRA in 1986, which was declared part of the final RA in the OU-2 ROD (1997). The SVE system removed 116,119 lbs of chlorinated solvents from 1986-2000, at which time it was shut down and dismantled. A closeout report for VOC-contaminated soil received partial approval from the regulators in 2002. Final approval is subject to resolution of land use control (LUC) issues.

Based on a separate ROD requirement, additional shallow soils characterization was completed in 2001 to assess metal contamination remaining at the site. In 2002, the regulators approved a work plan for soil excavation, stabilization, and disposal off-site. The site was cleaned up to site-specific industrial standards. Approximately 1,381 cy were removed in November 2002, which completed the field work. The closeout report for this work received partial approval from the regulators in 2004. Final approval is subject to resolution of LUC issues.

STATUS

RRSE RATING: High (1A)

CONTAMINANTS: VOCs, Metals, Nitroglycerin, PCBs

MEDIA OF CONCERN: Soil

COMPLETED IRP PHASE: PA/SI, RI/FS, IRA, RD

CURRENT IRP PHASE: RA(C), RA(O)

FUTURE IRP PHASE: LTM

PROPOSED PLAN

Execute a ROD Amendment to document the soil removal and LUCs (expected in 2004).

Five-year groundwater monitoring (2003-2007), which will be funded under TCAAP-19.

Resolve LUC issues (expected in 2004) in order to obtain final regulatory approval for soil RA(C) closeout reports (in 2005). LUC implementation and cover maintenance (National Guard), and 5-year reviews (funded under TCAAP-19) will continue indefinitely, and are considered RA(O) until Response Complete, and then will be considered LTM.

OU-2 CHEMICAL BURIAL AREA (SITE E)
TCAAP-07

SITE DESCRIPTION

In the early 1940s, Site E, approximately 8.8 acres, was used as both a construction debris and trash landfill and as a burning ground for ammunition boxes and other materials, including large quantities of unknown chemicals. Both the dump and the burning area were closed in 1949.

The OU-2 ROD (1997) required excavation, stabilization, and off-site disposal of the contaminated soil. The site was cleaned up to site-specific industrial standards. Approximately 21,097 cy of contaminated soil were removed from the site from 1999-2001, which completed the field work. Also, a soil cover was constructed over a portion of the site where asbestos containing material remains in-place. A closeout report for shallow contaminated soils received partial approval in 2002 from the regulators. Final approval is subject to resolution of land use control (LUC) issues.

STATUS

RRSE RATING: High (1A)

CONTAMINANTS: Metals

MEDIA OF CONCERN: Soil

COMPLETED IRP PHASE:
PA/SI, RI/FS, RD

CURRENT IRP PHASE:
RA(C), RA(O)

FUTURE IRP PHASE:
LTM

PROPOSED PLAN

Five-year groundwater monitoring (2003-2007), which will be funded under TCAAP-19.

Resolve LUC issues (expected in 2004) in order to obtain final regulatory approval for the soil RA(C) closeout report (in 2005). LUC implementation and cover maintenance (National Guard) and 5-year reviews (funded under TCAAP-19) will continue indefinitely, and are considered RA(O) until Response Complete, and then will be considered LTM.

OU-2 LANDFILL (SITE G)
TCAAP-09

SITE DESCRIPTION

Site G, approximately 4.6 acres, was used as a general dump area for the disposal of rubble, asphalt pavement, barrels, oil filters, rocket propellant research materials, floor-absorbent sweepings, metal dusts and grindings, burning operation ashes, and scrap roofing debris. Operations appear to have begun during WWII and continued through 1976.

An 18-inch thick clay cover was installed at the site in 1985. An SVE system was implemented as an IRA in 1986, which was declared part of the final RA in the OU-2 ROD (1997). The SVE system removed 104,418 lbs of chlorinated solvents from 1986-2000, at which time it was shut down. In 2002, the regulators approved revised remediation goals based on the existing cover minimizing the potential for leaching to groundwater. Beyond maintenance of the cover, no further action is required for VOC-contaminated soil. The SVE system was removed in 2003 with regulatory concurrence.

The OU-2 ROD also required additional characterization to determine the appropriate course of action for the general dump. In 2003, the regulators approved a report discussing these matters, along with a work plan for improving the cover system. The cover construction work was also completed in 2003. The remedy meets industrial solid waste rules. The closeout report for the VOC-contaminated soil and dump is expected to receive partial approval from the regulators in 2004 . Final approval is subject to resolution of land use control (LUC) issues.

STATUS

RRSE RATING: High (1A)

CONTAMINANTS:
Chlorinated Solvents

MEDIA OF CONCERN: Soil

COMPLETED IRP PHASE:
PA/SI, RI/FS, IRA, RD

CURRENT IRP PHASE:
RA(C), RA(O)

FUTURE IRP PHASE:
LTM

PROPOSED PLAN

Execute a ROD amendment to document the dump remedy and LUCs (expected in 2004).

Resolve LUC issues (expected in 2004) in order to obtain final regulatory approval for the RA(C) closeout report (in 2005). LUC implementation and cover maintenance (National Guard), and 5-year reviews (funded under TCAAP-19) will continue indefinitely, and are considered RA(O) until Response Complete, and then will be considered LTM.

OU-2 BURNING AREA/FILL SITE (SITE H)
TCAAP-10

SITE DESCRIPTION

Site H, approximately 11.7 acres, was a burning site with a burning cage located in the center. Burning (primarily wood, paper, cardboard, and combustible trash) took place from the early 1940s until the late 1960s. In addition to waste burning, portions of the site may have been used for burial and dumping of industrial sludge, paint residue, incineration ash, and solvents.

The OU-2 ROD (1997) required excavation, stabilization and off-site disposal of the contaminated soil. The site was cleaned up to site-specific industrial standards. Approximately 8,615 cy of contaminated soil was removed from the site from 1999-2001, which completed the field work. Also, a soil cover was constructed over a portion of the site where asbestos containing material remains in-place. A closeout report for shallow contaminated soils received partial approval in 2002 from the regulators. Final approval is subject to resolution of land use control (LUC) issues.

STATUS

RRSE RATING: High (1A)

CONTAMINANTS: Metals

MEDIA OF CONCERN: Soil

COMPLETED IRP PHASE:
PA/SI, RI/FS, RD

CURRENT IRP PHASE:
RA(C), RA(O)

FUTURE IRP PHASE:
LTM

PROPOSED PLAN

Five-year groundwater monitoring (2003-2007), which will be funded under TCAAP-19.

Resolve LUC issues (expected in 2004) in order to obtain final regulatory approval for the soil RA(C) closeout report (in 2005). LUC implementation and cover maintenance (National Guard) and 5-year reviews (funded under TCAAP-19) will continue indefinitely, and are considered RA(O) until Response Complete, and then will be considered LTM.

OU-2 129-3 LEACHING PITS
TCAAP-11

SITE DESCRIPTION

Site 129-3, approximately 2 acres, had three leaching pits which were used for disposal and flashing of contaminated wastewater, primarily from the lead styphnate primer mix facility that began operation in 1971 and ended about 1972. Disposal activity at the site may also have included the burning of scrap powder and lead styphnate wastes.

The OU-2 ROD (1997) required excavation, stabilization, and off-site disposal of the contaminated soil. The site was cleaned up to site-specific industrial standards. Approximately 3,460 cy of contaminated soil was removed from the site from 2000-2001, which completed the field work. A closeout report for shallow contaminated soils received partial approval in 2002 from the regulators. Final approval is subject to resolution of land use control (LUC) issues.

STATUS

RRSE RATING: High (1A)

CONTAMINANTS: VOCs, Metals, Nitroglycerin

MEDIA OF CONCERN: Soil

COMPLETED IRP PHASE: PA/SI, RI/FS, RD

CURRENT IRP PHASE: RA(C), RA(O)

FUTURE IRP PHASE: LTM

(For phytoremediation demonstration that occurred at Site 129-3, see Site TCAAP-29.)

PROPOSED PLAN

Five-year groundwater monitoring (2003-2007), which will be funded under TCAAP-19.

Resolve LUC issues (expected in 2004) in order to obtain final regulatory approval for the soil RA(C) closeout report (in 2005). LUC implementation (National Guard) and 5-year reviews (funded under TCAAP-19) will continue indefinitely, and are considered RA(O) until Response Complete, and then will be considered LTM.

OU-2 129-5 BURN AREA W OF HAMLINE AVENUE
TCAAP-12

SITE DESCRIPTION

Site 129-5, approximately 7.2 acres, was used for open burning of scrap explosives, bullets, spent solvents and disposal of primer/tracer sludge from about 1945/46 through the late 1950s. Areas of this site with observed surface debris were fenced in 1995.

The OU-2 ROD (1997) required excavation, stabilization, and off-site disposal of the contaminated soil. The site was cleaned up to site-specific industrial standards. Approximately 100 cy of contaminated soil was removed from the site in 1999, which completed the field work. A closeout report for shallow contaminated soils received partial approval in 2001 from the regulators. Final approval is subject to resolution of land use control (LUC) issues.

STATUS

RRSE RATING: Medium (2A)

CONTAMINANTS: Metals

MEDIA OF CONCERN: Soil

COMPLETED IRP PHASE:
PA/SI, RI/FS, RD

CURRENT IRP PHASE:
RA(C), RA(O)

FUTURE IRP PHASE:
LTM

PROPOSED PLAN

Five-year groundwater monitoring (2003-2007), which will be funded under TCAAP-19.

Resolve LUC issues (expected in 2004) in order to obtain final regulatory approval for the soil RA(C) closeout report (in 2005). LUC implementation (National Guard) and 5-year reviews (funded under TCAAP-19) will continue indefinitely, and are considered RA(O) until Response Complete, and then will be considered LTM.

OU-2 129-15 LANDFILL
TCAAP-13

SITE DESCRIPTION

Site 129-15, approximately 2 acres, was used as a landfill for construction debris from 1970 through 1978.

Polynuclear aromatic hydrocarbons (PAHs) were discovered during preliminary characterization of the dumped material in 1994.

The OU-2 ROD (1997) required characterization to determine the appropriate course of action for the dump. Characterization was performed in fall 1998 and lead was also identified as a contaminant of concern. The regulators approved a soil cover as the remedy for the dump. Construction of the soil cover was completed in FY 2002. A closeout report received partial approval in 2002 from the regulators. Final approval is subject to resolution of land use control (LUC) issues. The site was cleaned up to site-specific industrial standards.

STATUS

RRSE RATING: Low (3A)

CONTAMINANTS: PAH, Lead

MEDIA OF CONCERN: Soil

COMPLETED IRP PHASE:
PA/SI, RI/FS, RD

CURRENT IRP PHASE:
RA(C), RA(O)

FUTURE IRP PHASE:
LTM

PROPOSED PLAN

Execute a ROD amendment to document the final remedy and LUCs (expected in 2004).

Resolve LUC issues (expected in 2004) in order to obtain final regulatory approval for the RA(C) closeout report (in 2005). LUC implementation and cover maintenance (National Guard) and 5-year reviews (funded under TCAAP-19) will continue indefinitely, and are considered RA(O) until Response Complete, and then will be considered LTM.

OU-2 INDUSTRIAL OPS BLDG 502 & AREA (SITE I)
TCAAP-15

SITE DESCRIPTION

Site I, approximately 43 acres, consists of Building 502 and its associated structures and facilities. Building 502 was constructed in 1942 and was initially used for the production of .30-caliber ammunition. In 1944, the facility was converted to the production of 105-millimeter projectiles. When projectile production ended in 1945, a portion of the building was converted to storage, repair, and maintenance of ordnance processing machinery. During the early 1950s, the building was rehabilitated for the manufacture, storage, and shipment of artillery ammunition components. In 1958, Honeywell Defense Systems (now Alliant Techsystems Inc. [ATK]) assumed responsibility for general manufacturing activities in Building 502. In the late 1980s, ATK excavated a few thousand cubic yards of PCB-contaminated soil from around the building, which was stored on-site with regulatory agency concurrence. This material was disposed of in 1998 at an off-site facility. ATK continues to use the building as a manufacturing facility.

An engineering study indicates that the ROD requirement for extraction of shallow groundwater is not feasible at this site. The ROD requirement for additional characterization of Unit 1 and Unit 2 soil and groundwater was completed.

STATUS

RRSE RATING: High (1A)

CONTAMINANTS: Chlorinated Solvents, PCBs

MEDIA OF CONCERN: Groundwater, Soil

COMPLETED IRP PHASE: PA/SI, RI/FS, IRA, RD

CURRENT IRP PHASE: RA(C), RA(O)

FUTURE IRP PHASE: LTM

PROPOSED PLAN

Continue RA(O) of the shallow groundwater remedy, which will be funded by ATK.

Execute a ROD amendment (expected in 2004) to discontinue the ROD requirement for pumping (funded by ATK).

Resolve land use control (LUC) issues (expected in 2004). LUC implementation and 5-year reviews (funded under TCAAP-19) will continue indefinitely, and are considered RA(O) until Response Complete, and then will be considered LTM.

Contaminated soils underneath Building 502 will be addressed when the building is removed.

ON RAB PAGE: In response to a RAB question in 2003 about depleted uranium (DU), a separate meeting outside of the IRP and RAB will be conducted to provide information to the public about the NRC (Nuclear Regulatory Commission) license decommissioning at Building 502.

OU-2 INDUSTRIAL OPS BLDG 103 & AREA (SITE K)
TCAAP-16

SITE DESCRIPTION

Site K, approximately 21 acres, consists primarily of Building 103, a two-story structure built in 1943. The building comprises more than 410,000 square feet and was used for munitions manufacturing and assembly operations during WWII. During the early 1950s, the building was reactivated for the production of small caliber ammunition, using various solvents to clean machines, parts, and floors. In 1952, for example, solvents were used at a rate of 1,000 gallons weekly. In 1961, the operations were again reactivated for the production of fuzes, mines, and weapon systems by Honeywell and subsequently Alliant Techsystems Inc. (ATK). Currently, Building 103 is not occupied.

STATUS

RRSE RATING: High (1A)

CONTAMINANTS:
Chlorinated Solvents

MEDIA OF CONCERN:
Groundwater, Soil

COMPLETED IRP PHASE:
PA/SI, RI/FS, IRA, RD, RA(C)

CURRENT IRP PHASE: RA(O)

FUTURE IRP PHASE: LTM

A containment pump and treat system (IRA), started in 1985, is currently operating at the site to remove chlorinated solvents from the shallow groundwater. The OU-2 ROD (1997) designated this system as part of the final RA. Other ROD requirements have been completed, and the Remedial Action Completion Report for shallow groundwater was approved by the regulators in 2003.

PROPOSED PLAN

Continue RA(O) of the groundwater pump and treat system, which will be funded by ATK.

Resolve land use control (LUC) issues. LUC implementation and 5-year reviews (funded under TCAAP-19) will continue indefinitely, and are considered RA(O).

Contaminated soils underneath Building 103 will be addressed when the building is removed.

OU-1 DEEP GROUNDWATER
TCAAP-17

SITE DESCRIPTION

Past industrial activities at TCAAP have resulted in VOC contamination of deep aquifers (Units 3 and 4). Off-post, the VOC plumes diverge into what are termed the north plume (TCAAP-17) and south plume (TCAAP-27). Operable Unit 1 addresses the north plume.

A permanent granular activated carbon (PGAC) treatment facility with a capacity of 3,900 gallons per minute was installed in New Brighton in June 1990. This system supplies drinking water to area residents and aids in the remediation of the off-TCAAP contaminated groundwater plume.

The OU-1 ROD (1993) required additional production wells for containment of the plume. Construction was completed in 1998. RA(O) is executed by New Brighton using funding established by the settlement agreement with the Army.

STATUS

RRSE RATING: High (1A)

CONTAMINANTS:
Chlorinated Solvents

MEDIA OF CONCERN:
Groundwater

COMPLETED IRP PHASE:
PA/SI, RI/FS, RD, IRA, RA(C)

CURRENT IRP PHASE: RA(O)

FUTURE IRP PHASE: LTM

Other ROD requirements include alternate water supply/well abandonment, well advisory, monitoring, and reporting, which are funded under TCAAP-19.

The ROD containment requirement is currently under review by the Army, regulators, RAB, and New Brighton. It is anticipated that a ROD amendment will be executed which replaces the requirement for containment with a requirement to demonstrate aquifer restoration. Associated with this, the Army is required to install additional deep monitoring wells.

PROPOSED PLAN

Resolve technical issues, including installation of monitoring wells in 2004, and then execute a ROD amendment (funded under TCAAP-19).

Operation of the groundwater treatment system is expected to run through 2040.

OU-2 DEEP GROUNDWATER
TCAAP-19

SITE DESCRIPTION

This site addresses deep groundwater contamination in lithological Units 3 & 4 within the original TCAAP boundary.

A containment pump and treat system (IRA) was completed in June 1987. Known as the TCAAP Groundwater Recovery System (TGRS), the IRA included 12 extraction wells along the southwest boundary to capture contamination migrating off-post, and five source control wells near known contamination sources. Discharge water from the wells is treated through air strippers and recharged via the TCAAP gravel pit. A fraction of the treated water is treated further with granular activated carbon, and used by the occupants of TCAAP.

STATUS

RRSE RATING: High (1A)

CONTAMINANTS:
Chlorinated Solvents

MEDIA OF CONCERN:
Groundwater

COMPLETED IRP PHASE:
PA/SI, RI/FS, IRA, RD, RA(C)

CURRENT IRP PHASE:
RA(O)

FUTURE IRP PHASE:
LTM

The OU-2 ROD (1997) designated the TGRS as the final RA, and required a reconfiguration analysis to optimize mass removal. The resulting TGRS Operating Strategy was approved by the regulators in 2003. Interim measures, including installation of a replacement extraction well, were already implemented in 2002 with regulatory approval. The operating parameters for the replacement well necessitate further adjustments to the Operating Strategy, which are currently being resolved with the regulators and RAB.

Funding for TCAAP-19 also includes Corrective Action Management Unit (CAMU) closeout (the CAMU was removed with regulatory concurrence in 2002), Annual Performance Monitoring and Reporting, Five-Year Reviews, Well Abandonment, Administrative Record management, and RA(O) activities conducted by the Installation Support Services Contractor for TCAAP sites.

PROPOSED PLAN

Obtain regulatory approval for the reconfiguration plan Modification #3. Continue to conduct RA(O) of the TGRS, which is expected to run through 2040.

GRENADE TESTING AREA
TCAAP-20

SITE DESCRIPTION

The M550 Grenade Range, approximately 19 acres, consisted of two launching structures and three landing pads. The range was operated by Honeywell Defense Systems Division, now Alliant Techsystems, from March 1967 until July 1975.

Based on an EE/CA (1999) and an Action Memorandum (1999), a Removal Action was implemented, consisting of excavation, stabilization, and off-site disposal of contaminated soil. The site was cleaned up to site-specific industrial standards. Approximately 2,179 cy of contaminated soil were removed in 1999, which completed the field work. A closeout report received partial approval in 2002 from the regulators. Final approval is subject to resolution of land use control (LUC) issues.

STATUS

RRSE RATING: High (1A)

CONTAMINANTS: Metals

MEDIA OF CONCERN: Soil

COMPLETED IRP PHASE:
PA/SI, RI/FS, RD, EE/CA, REM

CURRENT IRP PHASE:
RA(C), RA(O)

FUTURE IRP PHASE:
LTM

PROPOSED PLAN

Three-year groundwater monitoring (2002-2004), which will be funded under TCAAP-19.

Resolve LUC issues (expected in 2004) in order to obtain final regulatory approval for the soil RA(C) closeout report (in 2005). LUC implementation (National Guard) and 5-year reviews (funded under TCAAP-19) will continue indefinitely, and are considered RA(O) until Response Complete, and then will be considered LTM.

OUTDOOR FIRING RANGE TEST AREA
TCAAP-21

SITE DESCRIPTION

The Outdoor Firing Range, approximately 150 acres, consists of three bullet catchers that were used for the testing of ammunition from the 1950s through the 1970s.

Based on an EE/CA (1999) and an Action Memorandum (1999), a Removal Action was implemented, consisting of excavation, stabilization, and off-site disposal of contaminated soil. The site was cleaned up to site-specific industrial standards. Approximately 990 cy of contaminated soil were removed in 1999, which completed the field work. A closeout report received partial approval in 2001 from the regulators. Final approval is subject to resolution of land use control (LUC) issues.

Near one of the range backstops, called the 1900-yard range, soil was found to be contaminated with polynuclear aromatic hydrocarbons (PAHs). In 2003, the regulators approved a work plan for placing a soil cover over roughly a 1/2-acre area. The cover was constructed in 2003, and an addendum to the closeout report is under review.

STATUS

RRSE RATING: High (1A)

CONTAMINANTS: Metals, PAHs

MEDIA OF CONCERN: Soil

COMPLETED IRP PHASE: PA/SI, RI/FS, RD, EE/CA, REM

CURRENT IRP PHASE: RA(C), RA(O)

FUTURE IRP PHASE: LTM

PROPOSED PLAN

Complete the closeout report addendum for the PAH contamination at the 1900 yard range (funded under TCAAP-19).

Resolve LUC issues (expected in 2004) in order to obtain final regulatory approval for the soil RA(C) closeout report (in 2005). LUC implementation and cover maintenance (National Guard) and 5-year reviews (funded under TCAAP-19) will continue indefinitely, and are considered RA(O) until Response Complete, and then will be considered LTM.

BLDG 135 PRIMER/TRACER AREA
TCAAP-23

SITE DESCRIPTION

This area, approximately 118 acres, consists of Building 135 and associated structures and utilities dedicated to the manufacture of small caliber ammunition primer and tracer mixtures. The manufacturing period included all of TCAAP production. The area is enclosed by an internal security fence due to potential explosion hazards associated with manufacturing facilities still in the 3X condition (all visible evidence of explosives has been removed). In addition to reactive hazards, there is potential contamination of structures, 11,500 feet of sewers, and area soils from production materials.

A site-wide preliminary assessment was performed for TCAAP in 1988; however, the primer/tracer areas were part of an Army mobilization mission at that time, so they were not investigated. Likewise, during the site-wide remedial investigation completed in 1991, this area was not included. Limited soil sampling was performed in 1996 to obtain a Relative Risk Site Evaluation (RRSE) score. Residual explosives may be present in the surrounding soils.

A Preliminary Assessment (PA) was approved in FY 2002, which recommended that a Site Inspection (SI) be performed. The SI field work was completed in 2002, and the report is under review. Based on preliminary data, an EE/CA is likely to be required.

STATUS

RRSE RATING: Low (3A)

CONTAMINANTS:
Explosives, Metals, VOCs, SVOCs, PCBs

MEDIA OF CONCERN: Soil, Sediment, Groundwater

COMPLETED IRP PHASE:
PA/SI

CURRENT IRP PHASE:
RI

FUTURE IRP PHASE:
RD, RA(C), LTM

PROPOSED PLAN

Complete the SI report. Based on current information, RD, RA(C), and LTM will be required.

ROUND, SUNFISH, AND MARSDEN LAKES
TCAAP-25

SITE DESCRIPTION

Sunfish, Marsden, and Round Lakes received runoff from TCAAP operations. All public activity at Round Lake is prohibited by the US Fish and Wildlife Service. There is no public access to Sunfish and Marsden Lakes, which are located within the fenced TCAAP/AHATS boundary.

USACHPPM performed a phased investigation and an ecological risk assessment for the surface water and sediments in these lakes. The Final Tier I Ecological Risk Assessment was approved by the regulators in November 1997. The Tier II Ecological Risk Assessment Work Plan was approved by the regulators in June 1999. The Tier II Ecological Risk Assessment report is expected to be completed in 2004, which will determine if a feasibility study (FS) is needed to consider a remedy for each of the waterbodies. US Fish and Wildlife is a key stakeholder in this process. Preliminary indications are that an FS is needed, at least for Round Lake.

STATUS

RRSE RATING: High (1A)

CONTAMINANTS: Metals, PCBs

MEDIA OF CONCERN: Sediments, Surface Water

COMPLETED IRP PHASE: PA/SI

CURRENT IRP PHASE: RI (Tier II Ecological Risk Assessment)

FUTURE IRP PHASE: FS

PROPOSED PLAN

Complete the Tier II Ecological Risk Assessment.

Prepare a FS, as needed, and document the remedy through a Decision Document (funded under TCAAP-19). For program planning purposes, it is assumed that No Further Action will be selected.

OU-3 DEEP GROUNDWATER
TCAAP-27

SITE DESCRIPTION

Past industrial activities at TCAAP have resulted in VOC contamination of deep aquifers (Units 3 and 4). Off-post, the VOC plumes diverge into what are termed the north plume (TCAAP-17) and south plume (TCAAP-27). Operable Unit 3 addresses the south plume.

The OU-3 ROD (1992) required construction of an extraction well to hydraulically contain the south plume. The water was treated by GAC in a facility operated by the City of New Brighton, and was discharged to the New Brighton municipal water system. The RA(O) started in 1994 and was executed by New Brighton, with reimbursement of costs by Alliant Techsystems Inc. (ATK). Levels of contamination were below action levels beginning in late 1998 at the containment boundary. TCAAP received regulatory approval in 2001 to temporarily stop pumping for remediation purposes. The extraction well and treatment system are currently in "stand-by" mode and groundwater monitoring continues.

Other RA(O) activities include alternate water supply/well abandonment and a well advisory, which are funded under TCAAP-19.

STATUS

RRSE RATING: High (1A)

CONTAMINANTS:
Chlorinated Solvents

MEDIA OF CONCERN:
Groundwater

COMPLETED IRP PHASE:
PA/SI, RI/FS, RD, RA(C)

CURRENT IRP PHASE:
RA(O)

FUTURE IRP PHASE:
LTM

PROPOSED PLAN

The extraction well and treatment system are expected to remain in "stand-by" status through December 2004, at which time the regulators will make a decision regarding continued operation of the well. It is anticipated that a ROD Amendment will be executed in late 2004/early 2005, memorializing that the extraction well is no longer needed for remediation purposes (funded by ATK).

Groundwater monitoring RA(O) will continue until cleanup levels are achieved, which is estimated at 2040, with this activity funded by ATK. Five-year reviews (funded under TCAAP-19) will likewise continue until cleanup levels are achieved.

BLDG 535 PRIMER/TRACER AREA
TCAAP-28

SITE DESCRIPTION

This area, approximately 60 acres, refers to Building 535 and an array of associated production building foundations and grounds used for the production of primer, tracer, and incendiary mixtures from 1941 through the early 1960s. The area is enclosed by an internal security fence due to potential exposure hazards associated with manufacturing facilities in the 3X condition (all visible evidence of explosives has been removed). Approximately fifty of the structures were burned down during the 1960s.

A site-wide preliminary assessment was performed for TCAAP in 1988; however, the primer/tracer areas were not investigated. Likewise, during the site-wide remedial investigation completed in 1991, this area was not included. Limited soil sampling was performed in 1996 to obtain a Relative Risk Site Evaluation (RRSE) score. Residual explosives may be present in the surrounding soils.

A PA was approved in FY 2002, which recommended that a Site Inspection (SI) be performed. The SI field work was completed in 2003, and the report is under review. Based on preliminary data, an EE/CA is likely to be required.

STATUS

RRSE RATING: Medium (2A)

CONTAMINANTS:
Explosives, Metals, VOCs, SVOCs, PCBs

MEDIA OF CONCERN:
Groundwater, Soil, Sediment

COMPLETED IRP PHASE:
PA/SI

CURRENT IRP PHASE: RI

FUTURE IRP PHASE:
RD, RA(C), LTM

PROPOSED PLAN

Complete the SI report. Based on current information, RD, RA(C), and LTM will be required.

AEC PHYTOREMEDIATION DEMONSTRATION PROJECT/CORRECTIVE ACTION TCAAP-29

SITE DESCRIPTION

In 1997, AEC sponsored a field demonstration project to phytoremediate lead-contaminated soil using Ethylenediaminetetraacetic Acid (EDTA) at Sites C and 129-3 at TCAAP. The demonstration project operated for two years. EDTA was applied to 90-foot by 90-foot plots at Site C and at Site 129-3 to facilitate the uptake of lead by crops that were planted on site. At Site C, lead and EDTA have migrated to the shallow groundwater table beneath the demonstration plot. The Army is performing a Notice of Violation (NOV)/corrective action to control the migration of lead-contaminated groundwater from Site C. At Site 129-3, it appears that no further action is needed.

STATUS

RRSE RATING: High (1B)

CONTAMINANTS: Metals

MEDIA OF CONCERN: Groundwater, Surface Water

COMPLETED IRP PHASE: PA, RI/FS, RD, RA, IRA, RA(C)

CURRENT IRP PHASE: RA(O)

FUTURE IRP PHASE: LTM

The Army initiated cleanup of the contaminated soil and groundwater as a non time critical removal action at Site C. MPCA informed Army that this was a NOV Corrective Action which takes precedence over the removal action. Army has put in place a containment corrective action. MPCA issued a Draft Stipulation Agreement in January 2002. Negotiations are on-going.

PROPOSED PLAN

Complete the negotiations of the Draft Stipulation Agreement.

In the meantime, meet the requirements of the NOV/corrective action and operate and maintain the system, which is funded under TCAAP-19.

Groundwater and surface water monitoring will continue, which is also funded under TCAAP-19.

OU-2 SEWAGE SLUDGE BURIAL (SITE B)
TCAAP-02

SITE DESCRIPTION

Prior to 1940, Site B, approximately 9.5 acres, was occupied by farmsteads. Detailed information on the history of waste activities at Site B is not available, but it is believed that sewage sludge may have been disposed at the site prior to 1966. Site B includes wetlands that provide potential habitat for the Blanding's turtle (on the MN threatened species list). A potential dump area is located in the southern portion of the site, this area extends beyond the designated site boundary. Evidence of this dump was not found during trenching.

The RI was completed in March 1997. Characterization of the dump was performed in Fall 1998 and no COCs were identified. No contamination was found. The site closeout report recommended NFA and received regulatory approval in April 2001.

Delisting actions will be funded under TCAAP-19.

STATUS

RRSE RATING: Medium (2A)

CONTAMINANTS: None

MEDIA OF CONCERN: Soil

COMPLETED IRP PHASE: PA/SI, RI/FS

CURRENT IRP PHASE: RC

OU-2 CHEMICAL BURN/BURIAL AREA (SITE F)
TCAAP-08

SITE DESCRIPTION

In 1951, Site F, approximately 10 acres, was used as a burning area. During the 1950s, waste munitions manufacturing by-products were burned, using propellant powder or oil to initiate burning. Cyanide pots and containers as well as waste explosives were also buried on the site. Burning continued from the 1950s through the early 1980s.

Closure of Site F is required under the Federal Facility Agreement for TCAAP, dated December 1987 and by the TCAAP installation RCRA permit. The Remedial Investigation was completed in March 1992. The Closure Plan called for on-site treatment of 12,000 tons of soil using separation, soil washing, and acid leaching methods. During excavation, the discovery of additional disposal areas increased the quantity of soil evaluated and treated to 24,748 tons. As of October 1995, all excavation and on-site treatment activities were complete. Final closure activities were initiated in 1996 and all contaminated soil was removed from the site in 1997. The site was cleaned up to unrestricted use. The final Closure Report was submitted and approved by the regulators in FY 1999. Delisting actions will be funded under TCAAP-19.

STATUS

RRSE RATING: High (1A)

CONTAMINANTS: Metals

MEDIA OF CONCERN: Soil

COMPLETED IRP PHASE: PA/SI, RI/FS, RD, RA

CURRENT IRP PHASE: RC

OU-2 SITE J
TCAAP-14

SITE DESCRIPTION

RESPONSE COMPLETE-
DELETED FROM AEDB-R DATABASE BY AEC

Site J was a portion of the sewer system for TCAAP. The Site J portion of the sewer system serviced production buildings 501, 502, 503, 535, and 576. Site J includes most of the sanitary and process waste lines, along with some segments of the storm drainage system in this area. Site J sewer lines were used for disposal of process wastes, oil and grease, heavy metals, solvents, explosives, lacquers, paint thinners, metal shavings, acids, and low level radioactive wastes.

The Site J portions of the sewer system have since been cleaned; the surrounding soils and groundwater along the pipeline have been subsequently investigated. No contamination was found.

The Site J Closure Report recommended no further action and was approved by the regulators in December 1993.

Delisting actions will be funded under TCAAP-19.

STATUS

RRSE RATING: NA

CONTAMINANTS:
PCBs, Solvents, Metals, Radionuclides

MEDIA OF CONCERN:
Groundwater, Soil

COMPLETED IRP PHASE:
PA, SI, RI, FS, RA

CURRENT IRP PHASE: RC

WATER TOWER AREA
TCAAP-22

SITE DESCRIPTION

The Water Tower Area, approximately 2.4 acres, was a site used for the surface disposal of brass and shell casings.

Based on analyses performed in 1990 on the materials, the top two feet of the soil/metal mixture was excavated and hauled off-site and disposed of as solid waste in 1993. Clean fill material was hauled in and graded on the site. A report was submitted and approved by regulatory agencies in 1993.

STATUS

RRSE RATING: Low (3A)

CONTAMINANTS: Metals

MEDIA OF CONCERN: Soil

COMPLETED IRP PHASE:
PA/SI, RI/FS, RD, RA(C)

CURRENT IRP PHASE: RC

RECREATIONAL TRAP SHOOTING AREA
TCAAP-24

SITE DESCRIPTION

The Trap Range refers to a recreational trap-shooting range located east of the former residential housing area in the north-west corner of TCAAP. Historical newspapers refer to plant workers forming trap-shooting leagues at the “recreational area” of TCAAP. Dates of activity are unknown.

Limited field sampling was performed in 1996. An RI in 1999, found no evidence of contamination. NFA was recommended and approved by the regulators.

STATUS

RRSE RATING: Low (3A)

CONTAMINANTS: Metals

MEDIA OF CONCERN: Soil

COMPLETED IRP PHASE: PA/SI, RI

CURRENT IRP PHASE: RC

ALL UNCHARACTERIZED SITES
TCAAP-26

SITE DESCRIPTION

This site refers to the remaining areas within TCAAP that have a completed Preliminary Assessment/Site Investigation level of investigation that resulted in no additional contamination being identified.

STATUS

RRSE RATING: NE

CONTAMINANTS: None Identified

MEDIA OF CONCERN: None Identified

COMPLETED IRP PHASE: PA/SI

CURRENT IRP PHASE: RC

PAST MILESTONES

1978

- "Installation Assessment of Twin Cities Army Ammunition Plant Report No. 129" comprised of site visit, records search, and employee interview information detailing waste management practices. **(October)**

1981

- Army and MPCA discovered chlorinated solvents or "VOCs" in TCAAP and City of New Brighton drinking water supplies, indicating that TCAAP may be the source of contamination. **(June)**

1983

- Army began supplying bottled water to residents outside the southwest TCAAP boundary and conducted a public meeting to discuss temporary granular activated carbon (GAC) treatment for New Brighton. In addition, the Army completed the TCAAP Environmental Survey Report (Phase I), to evaluate the extent and sources of VOC contamination. **(May)**
- Temporary GAC treatment facility for the City of New Brighton became operational. **(June)**
- TCAAP/New Brighton/Arden Hills Proposed NPL site HRI evaluation was completed and changed to final status with a score of 59.6. **(September)**

1984

- Army completed the TCAAP Environmental Survey Report (Phase II), to evaluate the extent and sources of VOC contamination and to determine localized and regional impacts on VOCs in groundwater. Engineering Analysis of Alternative Remedial Measures (Phase III) was completed and indicated that implementation of a remedial action was essential at TCAAP Sites D and G. **(June)**

1986

- Soil Vapor Extraction (SVE) system, or "soil-vacuuming" technique for removing VOCs from the soil, became operational at TCAAP Site D. **(January)**
- SVE system for removing VOCs from the soil became operational at TCAAP Site G. **(February)**
- Air stripping units to remove VOCs from groundwater at TCAAP Sites I and K, managed by Honeywell, became operational.

1987

- Preliminary Assessment (PA) report documenting and evaluating past TCAAP environmental data was completed. **(February)**
- TCAAP Groundwater Remediation Phase I: Boundary Groundwater Recovery System (BGRS), designed to capture contaminated groundwater from migrating beyond the southwest TCAAP boundary, became operational. **(October)**
- Three-party Army/EPA/MPCA Federal Facility Agreement (FFA) became effective. **(December)**

PAST MILESTONES (cont)

1988

- Litigation Settlement Agreement (LitSAG) between the City of New Brighton and Army for permanent safe drinking water supply for the New Brighton municipal water system became effective. **(August)**

- Groundwater Recovery System (GRS) to remove VOCs from shallow groundwater and to reduce contamination migration from TCAAP Site A became operational. **(September)**

1989

- TCAAP Groundwater Remediation Phase II: TCAAP Groundwater Recovery System (TGRS), an expansion of the BGRS, designed to limit source contamination from entering the groundwater and to enhance the capture of contaminated groundwater from migrating beyond the southwest TCAAP boundary, became operational. **(January)**

- Litigation Settlement Agreement (LitSAG) between the City of St. Anthony and Army for permanent safe drinking water supply for St. Anthony municipal water system became effective. **(February)**

- Thermal treatment, by incineration, of 1,400 cubic yards of soil contaminated with polychlorinated biphenyls (PCBs) was completed. **(September)**

1990

- Permanent groundwater GAC treatment facility for the City of New Brighton became operational. **(June)**

- Permanent groundwater GAC treatment facility for the City of St. Anthony became operational. **(December)**

1991

- MPCA completed the Off-TCAAP Remedial Investigation (RI) report documenting the extent of environmental contamination outside the installation boundary. **(March)**

- EPA completed the Human Health Risk Assessment (HHRA) report describing TCAAP contamination exposure pathways and cancer risks on the population. **(May)**

- Army completed the On-TCAAP RI report documenting the extent of environmental contamination on installation property. **(July)**

- Army completed the Draft Tier I Ecological Risk Assessment (ERA) report describing the effects of environmental contamination on the wildlife habitat. A public meeting was conducted to present results from the On-TCAAP RI, the Off-TCAAP RI, HHRA, and ERA reports and to emphasize transition of the project to the Feasibility Study (FS) phase. **(November)**

PAST MILESTONES (cont)

1992

- Werlein (citizen) lawsuit settlement with 99 plaintiffs completed out of court. **(April)**
- OU-3 FS completed, recommending groundwater extraction for south plume containment using treated groundwater for municipal water supply. **(July)**
- OU-3 ROD signed. Well Inventory, Phase I completed. **(September)**
- Lowry Grove Trailer Park connected to safe municipal drinking water supply after contamination was discovered in the private well supplying the trailer park. **(December)**

1993

- Agreements defining responsibility and interactions between Alliant/New Brighton, Army/New Brighton, Army/Alliant, and New Brighton/Fridley became effective. New Brighton/Fridley Interconnection FS completed. OU-3 PGRS RD completed. **(March)**
- OU-3 PGRS RA construction start. An Engineering Evaluation/Cost Analysis (EE/CA) for Site A was completed for containment of contaminants along the north boundary of TCAAP. **(May)**
- New Brighton/Fridley Interconnection RD completed. **(June)**
- New Brighton/Fridley Interconnection construction started. **(July)**
- OU-1 FS and ROD completed. **(September)**
- Site A Removal Action Design completed. Grenade Range History (Preliminary Assessment) completed. **(October)**
- Construction started on Site A Removal Action. **(November)**
- Well Inventory Phase II completed. **(December)**

1994

- Site J Closure Report completed. OU-3 RA Construction completed. OU-3 RA Operation Start-Up. **(April)**
- Site A Removal Action Start-Up. 1993 Annual Monitoring Report completed. Draft-Final OU-2 Feasibility Study completed. **(June)**
- New Brighton/Fridley Interconnection completed. **(July)**
- Grenade Range Treatability Study completed. **(October)**

PAST MILESTONES (cont)

1995

- Well Inventory Phase III completed. Grenade Range Phase II Investigation completed. **(January)**
- Regulatory Investigation of Downgradient Surface Water Body (Valentine Lake) completed. **(July)**
- Site A, Building 308 removal completed. UXO Search TCAAP CERCLA Sites completed. CAMU Conceptual Design completed. OU-3 Control System Integration Final Design completed. Completed construction of OU-1 Raw Water Pipeline & PGAC modifications. **(September)**
- Installation Support Services Contract awarded to Alliant. OU-1 FS Performance Monitoring Plan completed. Arden Manor Trailer Park municipal water hook-up completed. **(October)**
- TCAAP Restoration Advisory Board (RAB) formed. **(December)**

1996

- Received consistency for Water Tower Site Closure Report. **(August)**

1997

- Completed OU-2 Feasibility Study. **(March)**
- Initiated OU-1 Well 15 construction. **(April)**
- Defined private wells for abandonment and alternate water supply. **(May)**
- Completed soil characterization for Sites A, D & G remedial design. **(June)**
- Field work for Final Site F Closure completed (with the exception of final cleaning of two soil storage/ handling pad areas). **(October)**
- Final Report, Tier I Screening Risk Assessment of Aquatic Ecosystems received consistency. **(November)**
- OU-2 ROD signed. **(December)**

1998

- Final Site A Investigation Report received consistency. **(January)**
- Completed Grenade Range EE/CA. Completed Outdoor Firing Range EE/CA. **(March)**
- OU-2 Groundbreaking Event for Remedial Action after the ROD was signed for the final operable unit. **(May)**
- Completed OU-2 RD/RA QAPP. Completed CAMU construction for OU-2 soils. Completed RA Construction at OU-1. **(June)**
- Initiated Site A Shallow Soil RA. Initiated Pilot Study of SVE for Deep Soils at Site D. **(July)**
- Completed Site A EE/CA for VOC-contaminated soils and began REM. Initiated Outdoor Firing Range REM. **(August)**
- Initiated Sites B and 129-15 Dump Characterization. Initiated shutdown evaluation of current shallow SVE systems at Sites D & G. **(September)**

PAST MILESTONES (cont)

1998 (continued)

- Initiated REM for Tar-Like Substances at Site G. **(October)**

1999

- Received the Department of the Army Environmental Security Award – Environmental Cleanup Installation. Completed Site I Preliminary Design Investigation Work Plan. **(January)**
- Completed Site K Preliminary Design Investigation Work Plan. **(February)**
- Completed Construction Report (1997-1998 Wells). Completed 1996 Off-Post Well Inventory Update. **(March)**
- Completed Well 14 & 15 Test Report. Completed Tier II Ecological Risk Assessment Work Plan. **(June)**
- Completed 1998 Monitoring Report/2000 Plan. **(July)**
- Completed Site F Closure Report. **(August)**
- Completed Site G Shallow Soils EE/CA. Completed Outdoor Firing Range Work Plan. **(September)**
- Completed Five Year Review Report - OU-1, OU-2, OU-3. **(October)**
- Completed Numerical Flow Model Report. Completed Grenade Range Work Plan. **(November)**
- Completed Site D & G Close-Out Investigation Work Plan. **(December)**

2000

- Completed Site D & G Operations Modification Report. Completed Trap Range Removal Preliminary Assessment. **(March)**
- Completed Site B Closure Report. **(April)**
- Completed Operable Unit 1 RA 72-Hour Pump Test Report. **(May)**
- Completed Operable Unit 1 RA Construction Report. **(August)**
- Completed 1999 Monitoring Report/2001 Plan. **(September)**

2001

- Completed Site B Dump Investigation, Characterization, and Close Out Report. Completed OU-1 Hydraulic Analysis of Containment. **(January)**
- Completed Site K Predesign Investigation Report. Completed Site I Dual Phase Vacuum Extraction Pilot Study, Predesign Investigation Report. Completed Progress Report for Site K Pilot Tests of Hydrogen Release Compound and Direct Hydrogen Delivery Using Gas Permeable Membranes. **(March)**

PAST MILESTONES (cont)

2001 (continued)

- Completed Revised Draft Final Preliminary Assessments for the 135 and 535 Primer/Tracer Areas. Completed Outdoor Firing Range and #150 Reservoir Site Soil Removal Action, Completion of Soil Removal Draft Final Closeout Report. **(April)**
- Completed Draft Sitewide Groundwater Monitoring Well Abandonment Work Plan. Completed Site A Soil Vapor Extraction/Air Sparging System Draft Startup Report. **(May)**
- Completed Technical Memorandum for Site E1-2 West Dump Cover Design. **(June)**
- Completed Technical Memorandum for Site G RRG Calculations. **(July)**
- Completed Comprehensive Work Plan, Site 129-15 Dump Cover. Completed Sitewide Groundwater Monitoring Well Abandonment Work Plan. Completed Startup Report for the Site A Soil Vapor Extraction/Air Sparging System. Completed Fiscal Year (FY) 2002 Installation Action Plan. **(September)**
- Completed Site D SVE Dismantlement Report. Completed Site A Shallow Groundwater Containment System. Completed Addendum 3 to the Site D and G Work Plan, Sampling and Analysis Plan, and Site Safety and Health Plan, Site D Shallow Soils Investigation. **(October)**
- Completed Addendum 1 to the Comprehensive Work Plan Remedial Design/Remedial Action Activities, Shallow Soil Sites for the CAMU Construction and Closure. **(November)**
- Completed Outdoor Firing Range and #150 Reservoir Site Soil Removal Action Completion of Soil Removal Closeout Report. Completed 135 Primer/Tracer Area Preliminary Assessment. Completed 535 Primer/Tracer Area Preliminary Assessment. Completed Predesign Investigation Report for Site K. Completed Remedial Action Completion and Shallow Soil Sites Close Out Report for Site A and Site 129-5 Activities. Completed Technical Memorandum for the TCAAP OU-1 Recommended ROD Modification. **(December)**

2002

- Completed Remedial Action Completion and Shallow Soil Sites Close Out Report for Site H Activities. **(February)**
- Completed Site Inspection for 135 Primer/Tracer Area, Work Plan, Field Sampling Plan, Site Specific Health and Safety Plan. **(March)**
- Completed Remedial Action Completion and Shallow Soil Sites Close Out Report for Site E Activities. Field Investigation Report for Site D Shallow Soils. **(June)**
- Technical Memorandum for the Site G Soil Leaching Values. **(July)**
- Site D Shallow and Deep Soil VOC Investigation and Close Out Report was completed. **(August)**

PAST MILESTONES (cont)

2002 (continued)

- Completed Fiscal Year (FY) 2003 Installation Action Plan. Completed the Comprehensive Work Plan, Sampling Analysis Plan, Site Safety and Health Plan for Remedial Design/Remedial Action Shallow Soil Sites. **(September)**

- Completed Remedial Action Completion and Shallow Soil Sites Close Out Report for Site 129-3 Activities. Completed Technical Memorandum for the Site C Characterization Work Plan. **(November)**

- Completed Site 129-15 Dump Investigation, Characterization, and Remedial Action Completion and Close Out Report. **(December)**

- Completed Site 129-15 Dump Investigation, Characterization, and Remedial Action Completion and Close Out Report. Completed the FY 2001 Annual Performance Report. **(December)**

2003

- Completed Remedial Action Report for Site K Activities. **(February)**

- Completed Phase II Sitewide Groundwater Monitoring Well Abandonment Completion Report. **(May)**

- Completed TGRS Operational Strategy. **June)**

NO FURTHER ACTION SITES

TCAAP-02 Sewage Sludge Burial (Site B)

TCAAP-08 Chemical Burn/Burial Area (Site F)

TCAAP-14 Site J (Not in AEDB-R)

TCAAP-22 Water Tower Area

TCAAP-24 Recreational Trap Shooting Area

TCAAP-26 All Uncharacterized Sites

Twin Cities Army Ammunition Plant
FY05 Schedule Chart

CURRENT PHASE | FUTURE PHASE

AEDB-R #	SITE NAME	PHASE	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011+
TCAAP-01	Early Burn/Burial Area (Site A)	RA(C)							
		LTM							
TCAAP-05	Open Burn Area/Salvage Area (Site C)	RA(C)							
		LTM							
TCAAP-06	Leach Pits/Solvent Burn (Site D)	RA(C)							
		LTM							
TCAAP-07	Chemical Burial Area (Site E)	RA(C)							
		LTM							
TCAAP-09	Landfill (Site G)	RA(C)							
		LTM							
TCAAP-10	Burning Area/Fill Site (Site H)	RA(C)							
		LTM							
TCAAP-11	Leaching Pits (Site 129-3)	RA(C)							
		LTM							
TCAAP-12	Burn Area W. of Hamline Ave (Site 129-5)	RA(C)							
		RA(O)							
TCAAP-13	Landfill (129-15)	RA(C)							
		LTM							
TCAAP-15	Industrial Ops Bldg 502 & Area (Site I)	LTM							
TCAAP-16	Industrial Ops Bldg 103 & Area (Site K)	LTM							
TCAAP-17	Deep Groundwater, OU-1	LTM							
TCAAP-19	Deep Groundwater, OU-2	RA(O)							
		LTM							
TCAAP-20	Grenade Range	LTM							
TCAAP-21	Outdoor Firing Range	LTM							
TCAAP-23	Bldg 135 Primer/Tracer Area	RD							
		RA(C)							
		LTM							
TCAAP-25	Lakes	RI/FS							
		RA(C)							
TCAAP-27	Deep Groundwater, OU-3	LTM							
TCAAP-28	Bldg 535 Primer/Tracer Area	RD							
		RA(C)							
		LTM							
TCAAP-29	Phytoremediation Demonstration	LTM							

Remediation Activities

PAST REM/IRA/RA:

TCAAP-01 (Site A):	· IRA groundwater treatment system
TCAAP-06 (Site D):	· IRA excavation and incineration of PCB-contaminated soil · IRA capping · IRA soil vapor extraction system for VOC-contaminated soil
TCAAP-08 (Site F):	· RA soil washing/leaching of contaminated soil
TCAAP-09 (Site G):	· IRA capping · IRA soil vapor extraction system for VOC-contaminated soil
TCAAP-15 (Site I):	· IRA groundwater treatment system
TCAAP-16 (Site K):	· IRA groundwater treatment system
TCAAP-17 (OU1 deep GW):	· IRA groundwater treatment system (PGAC)
TCAAP-19 (OU2 deep GW):	· IRA groundwater treatment system (BGRS/TGRS)
TCAAP-22 (Water Tower Area):	· REM solid waste removal
TCAAP-29 (Phyto Areas):	· IRA groundwater treatment system

CURRENT REM/IRA/RA:

TCAAP-01 (Site A):	· RA(O) of groundwater treatment system · RA(O) of soil vapor extraction system for VOC-contaminated soil · RA(C) for remediation of metals-contaminated soil (field work is completed; closeout pending LUCs)
TCAAP-05 (Site C):	· RA(C) for remediation of metals-contaminated soil (field work in progress)
TCAAP-06 (Site D):	· RA(O) of soil vapor extraction system (system has been dismantled; awaiting approval of closeout report)
TCAAP-07 (Site E):	· RA(C) for remediation of metals-contaminated soil (field work is completed; closeout pending LUCs)

Remediation Activities

CURRENT REM/IRA/RA: (continued)

TCAAP-09 (Site G):	· RA(O) of soil vapor extraction system (system shutoff pending resolution of revised cleanup goals)
TCAAP-10 (Site H):	· RA(C) for remediation of metals-contaminated soil (field work is completed; closeout pending LUCs)
TCAAP-11 (Site 129-3):	· RA(C) for remediation of metals-contaminated soil (field work is completed; closeout pending LUCs)
TCAAP-12 (Site 129-5):	· RA(C) for remediation of metals-contaminated soil (field work is completed; closeout pending LUCs)
TCAAP-13 (Site 129-15):	· RA(C) of cover for dump (field work is completed; closeout report and ROD ESD are underway)
TCAAP-15 (Site I):	· RA groundwater treatment system pilot study showed it is not feasible; a ROD Amendment is underway to delete this requirement
TCAAP-16 (Site K):	· RA(O) of groundwater treatment system
TCAAP-17 (OU1 Deep GW):	· RA(O) of groundwater treatment system and alternate water supply/well abandonment program
TCAAP-19 (OU2 Deep GW):	· RA(O) of groundwater treatment system
TCAAP-20 (Grenade Range):	· REM for remediation of metals-contaminated soil (field work is completed; closeout pending LUCs)
TCAAP-21 (Outdoor Firing Range):	· REM for remediation of metals-contaminated soil (field work is completed; closeout pending LUCs) · REM capping (work plan in progress)
TCAAP-27 (OU3 Deep GW):	· RA(O) of groundwater treatment system (remediation pumping is in standby mode)
TCAAP-29 (Phyto Areas):	· RA(O) of groundwater treatment system

Remediation Activities

FUTURE REM/IRA/RA:

TCAAP -01 (Site A): -05 (Site C) -06 (Site D) -07 (Site E) -09 (Site G) -10 (Site H) -11 (Site 129-3) -12 (Site 129-5) -13 (Site 129-15)	· RA(O) for shallow soils or dumps consisting of LUCs, five-year reviews, and delisting.
TCAAP -06 (Site D):	· RA(C) for remediation of metals-contaminated soil
TCAAP -09 (Site G):	· RA(C) of cap for dump
TCAAP -15 (Site I):	· RA(O) for groundwater monitoring, five-year reviews, and delisting
TCAAP -19 (OU2 Deep GW):	· RA(C) reconfiguration of groundwater treatment system
TCAAP -20 (Grenade Range): -21 (Outdoor Firing Range)	· RA(O) for LUCs
TCAAP -23 (135 P/T Area):	· REM for remediation of contaminated soils (assumed to be greater than a 50% chance of being required)

RESTORATION ADVISORY BOARD (RAB) STATUS

The TCAAP Restoration Advisory Board (RAB) was established in 1996. The RAB has established a Mission Statement, Operating Procedures and Policies.

Currently, the RAB consists of 11 community members and 4 non-community members. RAB meetings are held bi-monthly and members have inspected sites annually. Community RAB members participate in the Army/Regulatory Agency's Technical Review Committee monthly meetings. In the past, several community members have participated in the Region and National RAB Workshop and the IAP Workshop.

The RAB includes a Technical Committee, and a Communication Membership Committee. The Technical Committee reviews and comments on technical documents. The RAB was awarded a Technical Assistance for Public Participation (TAPP) Grant in 1999 for technical assistance.

The RAB received an award of appreciation from the State of Minnesota in 1999.

A Community Relations Plan is in place and was updated in 1997. TCAAP distributes a periodic newsletter to update the public on important restoration activities and milestones.